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ABSTRACT

The Council of Europe working party met for 13 days during their visits to Paris, Geneva, Stockholm, London, Frankfurt and Berlin in an attempt to assess current developments in the use of computers in the field of educational documentation and information and to learn about the adaptation of computer techniques in other fields. The report of the working party contains: (1) discussion, (2) conclusions and (3) plans and perspectives. The present use of computers for documentation and information is discussed and it is noted that, in education, no international (world-wide) or regional (European) system exists but rather only isolated national projects. The development of international systems in other fields has demonstrated the possibility of applying computer techniques to multi-national and multi-lingual documentation and information. Some of these international systems are described briefly as examples. The working party proposes a short-term plan (to 1975), a medium-term plan and long-term perspectives. The rapid advance of communications technology and the growing interdependence of research and development in all fields imply the possibility of a merger of documentation and information systems covering specific fields into an all-embracing system for the transfer of data, voice and images. (NH)

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EUDISED

EUROPEAN DOCUMENTATION AND INFORMATION SYSTEM FOR EDUCATION

Volume I

REPORT OF THE WORKING PARTY ON THE APPLICATION OF COMPUTER TECHNIQUES TO EDUCATIONAL DOCUMENTATION AND INFORMATION

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DOCUMENTATION CENTRE FOR EDUCATION IN EUROPE

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INTRODUCTION

The activities of the Council of Europe in the field of educational documentation and information stem from Resolution No. 5 of the Third Conference of European Ministers of Education which was held in October 1962 in Rome. The Resolution stressed that intergovernmental co-operation in education is only possible on the basis of an organised exchange of information and recommended that the Council of Europe be given the appropriate means to establish a Documentation Centre.

Pursuant to this Resolution, the Documentation Centre for Education in Europe was created in 1964. The Centre operates a number of information projects in co-operation with national correspondents nominated by member Governments. Amongst these projects are the News-Letter, the Information Bulletin, the Basic Educational Bibliographies and, in co-operation with UNESCO, the Abstracts on educational policy and legislation. The Centre furthermore arranges Seminars in member States on common problems of educational documentation and information and organises technical assistance to newly-created national centres.

However, the question must be raised whether the objective set forth by the European Ministers of Education to organise the exchange of information as a basis for educational co-operation in Europe can be achieved by means of the existing system. The answer, undoubtedly, is that it can not. The survey on the educational documentation and information system in Europe, carried out by the Documentation Centre in 1967 and published in 1968, showed that well over a hundred small centres in member States are trying to cope with the ever-growing flow of information resulting from the knowledge explosion in the social sciences and in education. They are still using the traditional methods of librarianship. Computerised documentation and information, well established in science, medicine and technology, is not yet applied to education, although education, in most member States, has become the biggest national service. These centres, submarginal in personnel and equipment, can barely satisfy the national demand for information for educational planning and policy, research and development, reform and innovation, and are poor contributors to an international exchange of information. This system is obviously inadequate from the educational point of view and it is also economically wasteful, because the same processes of indexing, abstracting and disseminating of identical educational literature have to be carried out by each Centre.

The Secretariat, therefore, convened experts from member States in which experiments concerning the application of computer techniques to educational documentation and information were planned or already under way. The meeting took place in September 1968 at Strasbourg. The experts, in reporting on and discussing the experiments in which they were involved, stressed the necessity of thorough modernisation of the present educational documentation and information system in order to overcome its deficiencies. On the other hand, participants were alarmed by and drew attention to the fact that widely different systems and technologies for mechanised indexing, classifying, storage and retrieval were being developed in member States. Once the application of such different systems and technologies had involved major investment in computer programs and equipment, it might be found impossible to change them. The meeting felt that the present situation still provided a unique opportunity to frame and implement a long-term plan for European co-operation in this field. It therefore urgently recommended that ways of promoting the co-ordinated application of new techniques to educational documentation and information at the national and international levels be considered in order to prevent incompatible and irrevocable developments in the various member States.

The Council for Cultural Co-operation, to which the report of the meeting was submitted at its September 1968 session, consequently set up a working party on the application of computer techniques to educational documentation and information. The working party was asked to visit the principal institutions concerned with developments in this field; to report in detail on the situation as it is at present and will evolve in the foreseeable future; and to formulate a medium- and long-term plan for co-ordination and further development of educational documentation and information in Western Europe.

The working party comprised the following experts nominated by their Governments:

FRANCE	M. J. MAJAULT, Directeur Adjoint, Institut Pédagogique National, Paris. (Represented at some meetings by M. C. BONNEFOI, Professeur chargé d'études, Institut Pédagogique National.)
FEDERAL REPUBLIC OF GERMANY	Dr. K. SPANGENBERG, Pädagogisches Zentrum, Berlin.
SWEDEN	Miss E. EKMAN, Head Librarian, Statens psykologisk-pedagogiska bibliotek, Stockholm.
SWITZERLAND	Professor Dr. E. EGGER, Directeur du Centre d'Information en matière d'enseignment et d'éducation, Genève.
UNITED KINGDOM	Mr. A. PRICE, Office for Scientific and Technical Information, Manchester.

Professor Dr. E. EGGER was elected Chairman and Dr. K. SPANGENBERG rapporteur. The Head of the Secretariat's Division for Educational Documentation and Research, Mr. B. von MUTIUS acted as Secretary to the working party. Mr. G. W. PARKYN (UNESCO) and Mr. A. KIRCHBERGER (OECD/CERI) attended its final meetings as observers.

The working party visited institutions concerned with developments in the application of computer techniques to documentation and information primarily in education and the social sciences, in Paris, Geneva, Stockholm, London, Frankfurt and Berlin at the end of 1968 and the beginning of 1969. The report of the working party was drafted by its rapporteur and revised by its members. It reached the Secretariat towards the end of 1969. The report of the working party expresses the personal views of its members.

A number of national reports and technical studies were commissioned by the Secretariat on the recommendation of the working party. Both the reports and the studies are intended to draw attention to certain national developments and technical problems which should be taken into consideration in all further deliberations. The selection, however, does not claim to be comprehensive. These reports and studies should be considered as personal contributions by their authors.

The report of the working party (Volume I) is published in both English and French. For technical reasons the National Reports, Volume II, and the Technical Studies, Volume III, are published in English only, with summaries in French prepared by the Secretariat.

In submitting the report on the application of computer techniques to educational documentation and information in Europe, the Secretariat wishes to thank all institutions that gave hospitality to the working party and all persons who contributed information. The Secretariat expresses its gratitude to the authors of national reports and technical studies and, particularly, to the members of the working party and to the rapporteur, Dr. K. SPANGENBERG, who drafted the report.

The Secretariat hopes that this report may lead to concerted national and international action to make full use of the new technologies at our disposal and to transform, step by step, our traditional system of educational documentation and information into a co-operative European system as part and partner in a world-wide system.

Niels BORCH-JACOBSEN
Director of Education and of
Cultural and Scientific Affairs

Strasbourg
December 1969

SUMMARY

The report of the working party contains three chapters:

- Discussion

- Conclusions

- Plans and perspectives

DISCUSSION

After mentioning the institutions and projects visited by the working party and the further sources from which it gathered its evidence (1.1), the report discusses the *present use of computers* for documentation and information, stating that in education no international (i.e. world-wide) or regional (e.g. European) system exists, but only isolated national projects (1.21). In fields other than education, numerous international systems are in operation or being developed. They have demonstrated that it is possible to apply computer techniques to multi-national and multi-lingual documentation and information and thereby evaluate, compress and organise all significant data in a particular field for more efficient and more widely extended utilisation. Some of these systems /MARC II, MEDLARS, INSPEC (1.22), ISIS, INIS (1.3)/ are described briefly as examples. It will be noted that the existing international systems are in no way confined to natural science and technology. MARC, for instance, is concerned with library management, and ISIS with the social sciences.

In dealing with the approaches to and requirements of *international co-operation* in documentation and information, the report quotes the following statement by a well-known expert:

> "If certain minimal international agreements can be reached soon enough, at least on certain matters - mostly having to do with the essential standards for the mechanisation of information transfer - it is quite possible that the national systems, which will inevitably be developed, will be designed from the start to be compatible with the international system. . . If, on the other hand, the basic international agreements are not reached soon enough, heavy pressures will force the individual countries to develop machine-language systems which may well be incompatible, thus greatly delaying and reducing the mutual benefits of international co-operation" (1.4).

It is not only the inefficiency of isolated and poorly equipped national documentation and information centres in education in Western Europe which calls for international co-operation on the basis of computerisation, but also the growing amount of information in newly emerging specialist fields such as educational technology, language teaching etc. Documentation and information in these fields are already approaching a European and even world-wide scale and are, at least partly, experimenting with computer techniques (1.5).

The problem of *costs* is seen in relationship to benefits. "Considering that member Governments of the Council of Europe are engaged on medium-term and long-term educational planning with accompanying research and evaluation, and with information increasing two-fold in under ten years, their efforts might fail to keep up with the times unless they have resort to a solid body of analysed, compressed, and organised up-to-date information." As each Government will, therefore, have to establish and improve its own documentation services, "the only financial saving that could be achieved would be through the avoidance of analysing, compressing and organising relevant literature from other countries, relying instead on contributions to a shared European and international system", which would need to be computer based (1.6).

Although it was not possible at this stage to present any cost estimates, it can be maintained that "a well-organised, co-ordinated and computer-based European system acting as a partner in an international co-operative system would certainly be much cheaper than the aggregate cost of each individual country satisfying its own needs by means of its own computer-based national educational documentation and information system". The section on costs contains some figures on expenditure on the US ERIC project and on ISIS (1.6).

The chapter concludes with a résumé of trends in the *foreseeable technological development* of automated documentation and information (1.7).

CONCLUSIONS

On the basis of their visits and discussions and by analysing the available material the working party came to the following conclusions (2):

(i) "Educational documentation and information are generally considered a vital prerequisite for educational development and innovation in Europe. Present arrangements, however, *do not adequately* meet the needs of policy makers, researchers, administrators, teachers and others concerned.

(ii) "Technological developments in automatic documentation have for the first time made it possible for a *'once-and-for-all' intellectual effort* in the analysis of documents made at one place to be used by a theoretically unlimited number of other centres and users provided that these centres co-operate at regional level to develop common targets for analysis, common standards, and common targets for production and services. In this way inefficient handling of data at innumerable places and centres, duplication of work and consequent waste of money can be avoided.

(iii) "The working party proposes the creation of a computer-based *European Documentation and Information System for Education (EUDISED)*, in the geographical region covered by the member states of the Council for Cultural Co-operation. This should proceed in three phases. The working party therefore submits proposals for a short-term plan up to 1975, for a medium-term plan after 1975, and perspectives for long-term development.

(iv) "EUDISED should be considered as a *regional* system within the framework of the emerging world-wide educational documentation and information system under the sponsorship of UNESCO.

(v) "EUDISED should not be a centralised system but *decentralised*, as the available data on international systems already in operation or being planned prove the advantages of decentralisation.

(vi) "The *efficiency* of any decentralised system primarily depends on the quality and appropriateness of rules commonly adopted and observed, the distribution of functions among the co-ordinating centre(s) and the participating centres, and the efficiency of each participating centre.

(vii) "Particularly during the initial phase of the development of EUDISED, member states should concentrate on the *modernisation, expansion and reinforcement* of their own national centres and systems, so that they can develop into efficient partners, co-operating both nationally and internationally.

(viii) "Specialised centres will be on the increase, at the national and international level. The working party conceives of *chains* of such centres specialised in a particular subject field of education and co-operating regionally within EUDISED.

(ix) "The working party suggests the co-ordination of national documentation and information systems and/or specialised documentation centres in each particular *language area*, such as English, French, German, Scandinavian etc.

(x) "EUDISED should be developed as a *network* based on national documentation and information, on language area co-ordination and on co-operating chains of specialised documentation centres in the field of education.

(xi) "Considering the great number of different languages spoken in the member states of the Council of Europe and aware that machine translation of natural languages is not yet a practical possibility, the working party suggests that for technical and organisational reasons *English* should be the carrier language of computer-stored information within EUDISED.

(xii) "The working party proposes the establishment of a *steering group* for EUDISED, composed of experts from national centres and international organisations, to guide all activities concerned with its implementation in phases 1 to 3 and its co-operation in a world-wide system. The steering group should report to member Governments at regular intervals."

PLANS AND PERSPECTIVES

Short-term plan up to 1975

Proposals for immediate implementation up to 1975 include:

- Further *modernisation, expansion and reinforcement* of national, language area, and specialised educational documentation and information centres on the basis of co-ordinated development plans (3.1).

- *Training of personnel* for computer-based documentation and information both at the national and the European levels (3.1).

- *Collaboration with UNESCO - IBE* for establishing contacts between national educational documentation and information systems in North America, Western Europe, Eastern Europe and other regions (3.11).

- Preparation of detailed *agreements* to be checked by field-tests on:

  - targets for analysis (3.12)
  - common standards (3.13)
  - targets for production and services (3.14).

In this connection the working party proposes that a number of *preparatory studies* should be carried out under the guidance of the EUDISED Steering Group, for instance a survey on the information needs of teachers, educational researchers and decision-makers in various European countries, a series of tests on the feasibility of using the *Information Retrieval Thesaurus of Education* or the second edition of the *ERIC Thesaurus* as a general thesaurus for EUDISED, etc. (3.133).

Medium-term plan

For this phase *specific plans* for the implementation of EUDISED should have been drawn up. They would have to be tested experimentally on a large scale, revised accordingly, and put into effect in those member States ready to co-operate. The way to subsequent extension to all member States should be prepared by the active involvement of national expert groups (3.2).

Long-term perspectives

The rapid advance of communications technology and the ever growing interdependence of research and development in all fields imply the possibility of a merger between documentation and information systems covering specific fields into an *all-embracing system* for the transfer of data, voice and images. The American EDUNET, which is still at the planning stage but has already been joined by universities and colleges comprising about two-thirds of the student population of the USA and Canada, is briefly described as an example of such long-term perspectives (3.3).

1 DISCUSSION

1.1 *General*

The working party on the application of computer techniques to educational documentation and information met for only 13 days altogether during their visits to Paris, Geneva, Stockholm, London, Frankfurt and Berlin in an attempt to assess current developments in the use of computers in the field of educational documentation and information and to learn about the adaptation of computer techniques in other fields. This is very little time as compared for instance with that spent by the study team preparing detailed proposals for the International Nuclear Information System (INIS). The INIS study team consisting of seven members worked from 4th March to 28th June, 1968 at the International Atomic Energy Agency aided by a computer sub-group staying in Vienna for between two and four weeks (cf. 24, p. III). Consequently the résumé of the visits and meetings of the Council of Europe working party could only lead to conclusions and proposals when the Technical Studies suggested by the working party and commissioned by the Secretariat from several experts, the National Reports, and documentation and information projects from other fields had been analysed additionally and used as reference material.

During their visits the working party learned about the following institutions and projects:

Paris:	1.	Document Processing Group of the Institut Pédagogique National
	2.	Délégation à l'Informatique
	3.	Centre National de la Recherche Scientifique
Geneva:	4.	Service de la recherche pédagogique, Canton de Genève
	5.	Service de la recherche sociologique, Canton de Genève
	6.	UNESCO Centre (International Bureau of Education)
	7.	ISIS project of the International Labour Office
	8.	World Peace through Law Centre
Stockholm:	9.	Library of Psychology and Education
	10.	Pedagogical Centre Stockholm
	11.	National Biomedical Centre including MEDLARS
	12.	Union Catalogue of Foreign Literature (Royal Library)
	13.	Abacus project of the Royal Institute of Technology Library
	14.	Educational research information project of the National Board of Education
London:	15.	Office for Scientific and Technical Information (OSTI)
	16.	INSPEC (Information Service in Physics, Electrotechnology, and Control)
	17.	Comparative Education Library of the Institute of Education, University of London

18. MARC II project (Machine Readable Catalogue Card Service) of the British National Bibliography and the Library of Congress, Washington

19. National Lending Library for Science and Technology

20. UK MEDLARS Information Retrieval Service

21. British Technology Index

22. Students' Chemical Information Project

Frankfurt/Main:

23. Institut für Dokumentationswesen in der Max-Planck-Gesellschaft

24. Zentralstelle für maschinelle Dokumentation

25. International Management Information System

26. Zentralarchiv für Empirische Sozialforschung

27. Overseas Documentation

28. Deutsche Bibliographie

29. International Food Information Service (IFIS)

Berlin:

30. Pädagogisches Zentrum

31. Co-ordination of reporting on research in education and the social sciences

32. Bibliographie Pädagogik

33. Bibliographie Programmierter Unterricht

As well as referring to the above-mentioned institutions and projects, the National Reports (Volume II) and the Technical Studies (Volume III), the rapporteur has also, in agreement with the other four members of the group, made use of additional material available to him and relevant to the working party's subject of study. Full titles are listed in alphabetical order at the end of this volume and are referenced in the text by title number.

1.2 *The use of computers for documentation and information*

1.21 *Educational documentation and information*

With the exception of the mission-oriented ISIS project of the International Labour Office, Geneva, which includes coverage of educational publications for its purpose, there is no evidence that computer techniques have so far been used in Europe for any documentation and information project in the field of education at the international level. Apart from ISIS, all projects known to the working party stem either from national initiative or from the initiative of institutions within a national area. Though many such approaches for international documentation and information in the fields of science and technology, subject-centred or mission-centred, have been reported, there have been none in the field of education, educational psychology, and educational sociology. Even machine-processed abstracting journals such as *Psychological Abstracts*, which aims to cover educational psychology, are primarily based on the analysis of literature of one language area.

Of educational documentation and information projects in European countries implemented with the help of computers, only the following can be listed:

France:

The project of the Document Processing Group, Institut Pédagogique National, Paris, with processing, storage, and retrieval of data on teaching aids and their use for the information of teachers (cf. 3).

Federal Republic of Germany:

(a) Publication of a monthly educational bibliography *Bibliographie Pädagogik* by a decentralised co-operating system of institutes including one in Austria. Annually circa 8,000 to 9,000 titles (books, periodical articles, reports), 17% non-German language literature (1967). Indexes listed by computer. Since 1968 machine-readable titles on punched paper tape (cf. 29).

(b) Special bibliography on programmed instruction, *Bibliographie Programmierter Unterricht*. Since 1968 machine-readable titles on punched paper tape (Pädagogisches Zentrum, Berlin).

(c) Special bibliography on educational television, *Schulfernsehen*. Since 1968 machine-readable titles on punched paper tape (Internationales Zentralinstitut für das Jugend- und Bildungsfernsehen, München).

(d) Special bibliography on language teaching, *Sprachunterricht. Neue Grundlagen und Medien*. Since 1968 machine-readable titles on punched paper tape (Informationszentrum für Fremdsprachenforschung an der Universität Marburg, Marburg).

(e) Abstract journal on youth research and policy, *Dokumentation Jugendforschung, Jugendhilfe, Jugendpolitik*. Since 1968 machine-readable titles and abstracts on punched paper tape (Deutsches Jugendinstitut, München).

For all publications named under (a) to (e) a special machine-readable format is used that has been developed and agreed upon by the institutions listed.

United Kingdom:

Production of the catalogue of periodicals of the Comparative Education Library, Institute of Education, University of London, with the help of a computer program developed for the MARC II project of the British National Bibliography.

Another aspect of educational documentation and information essential for educational planning as well as for research and development is concerned with the utilisation and interchangeability of individual statistical data. The working party could discuss this problem on only one occasion, while visiting the Service de la recherche sociologique, Geneva (cf. 14). There are many more local or national projects of this kind to be found in European countries.

The list of projects in European countries may not be complete at this stage of assessing educational documentation and information activities. It illustrates, though, a number of interesting examples that might usefully be considered when more far-reaching plans are discussed.

As to other countries' projects in the field of educational documentation and information based on electronic data processing, mention must be made of the ERIC (Educational Resources Information Center) project of the US Office of Education with a network of 19 ERIC clearinghouses in various subject fields (cf. 27).

Under this project - which began in 1964 - a monthly abstract publication, *Research in Education*, has been issued since 1966 and a *Current Index to Journals in Education* since 1969. The full texts of documents in *Research in Education* are made available in microfiche or hard copy form. The first version of the *Thesaurus of ERIC Descriptors* was published in 1966 and a revised version in 1969. Both *Research in Education* and *Current Index to Journals in Education* are prepared by computer. Production of the *Current Index to Journals in Education* involves computer organisation of its various type faces and layout for photo composition (cf. 27).

It can be assumed, though, that a number of projects now at the planning stage will need computer processing of data for their implementation. This will certainly be true for the plans developed by UNESCO-IBE to promote international, world-wide, documentation and information in which - in accordance with a resolution passed by its General Assembly in 1968 - the International Bureau of Education, Geneva, will be instrumental. It may also hold true for subject-centred projects of OECD, the Council of Europe and other future activities covering particular regions. It is, therefore, vital to the development of a national-regional-international documentation and information system to co-ordinate efforts and to profit from experience in order to save intellectual energy and financial resources.

Though a number of examples of the use of computers in the field of educational documentation and information can be studied already, projects from other fields, particularly in science and technology, need to be considered as well in order to obtain more data on possibilities of development.

1.22 *Other fields*

Among the 33 projects discussed and institutes visited by the working party only 11 dealt with educational documentation and information, five were serving both documentation and information in education and in science and technology, while the remaining 17 concerned other fields primarily science and technology. The INIS Report (cf. 24, p. 3) refers to these other fields when summarising developments since the middle sixties, as quoted below.

It was realised "that shared cataloguing, the standardisation of input and compatibility are prerequisites for the rational and efficient use of computers. Thus the concept of standardised input and unified storage as a basis for multi-purpose output was developed nationally, and later extended internationally, in the MARC project of the Library of Congress (1). The exploitation of duplicate tapes from MEDLARS (2), from the American Chemical Society, in a decentralised mode nationally and also in Europe, have provided a powerful stimulus to progress and have highlighted the many problems, of both management and indexing technique, that are still largely unresolved. At a more truly international level there are the shared facilities of ESRO (3) and ELDO (4) as the European partners of the NASA (5) Space Documentation Service" (cf. 24, p. 3).

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(1) MARC = Machine Readable Catalogue.

(2) MEDLARS = Medical Literature Analysis and Retrieval System.

(3) ESRO = European Space Research Organisation.

(4) ELDO = European (Space Vehicle) Launcher Development Organisation.

(5) NASA = National Aeronautics and Space Administration.

As some international approaches to mechanised documentation and information will be reported under 1.3, the following paragraphs will deal with projects the working party encountered and which originated at national level. Short summaries of MARC II, MEDLARS, and INSPEC will provide examples to illustrate possibilities for future development. Other examples are contained in the National Reports, e.g. the IFIS Project and the International Management Information System (cf. 10).

MARC II

The MARC II project (Machine Readable Catalogue Record Service) is a co-operative project of the British National Bibliography and the Library of Congress, Washington, which set up MARC I in 1966. The project stresses the interaction between mechanised systems and the general organisation of library systems and the book trade. Its end result is not a system but a product to be used in systems. The product is a bibliographic record sufficiently detailed to meet the requirements of virtually any system, and yet so structured that local systems can extract just the data elements required. The format elaborated is a medium for the exchange of bibliographic data of all types of material. It was designed to include data on periodical articles, reports, manuscripts, computer media, and audio-visual material (cf. 9). In the UK an agreement has been reached with book publishers to establish a standard book numbering system. This system could technically be worked out and expand internationally.

Though the "project is essentially designed to be fully exploited in a machine and library environment which scarcely exists" (cf. 9), it clearly points to possibilities of core formats (including book numbers) being assigned once and for all nationally or in international co-operation. On the basis of this work being done and tapes or extracts of them being made available to special documentation centres, a more detailed analysis of the book in question as well as formats and analyses of other documents and materials could be added for a more specialised record.

MEDLARS

MEDLARS (Medical Literature Analysis and Retrieval System) (cf. 19 and 39) was originally conceived and developed by the National Library of Medicine, Bethesda, Maryland, USA, starting in 1964 as a computer-oriented system for the analysis, storage, and retrieval of references to the biomedical literature published throughout the world. The present tapes contain records of circa 800,000 documents beginning about mid-1963. Each year approximately 175,000 articles from 2,800 journals are read by trained indexers who apply subject headings to describe their contents. The records thus made are manipulated by computer to produce *Index Medicus* and the computer retrieval tapes. A paper can have up to ten headings on tape but appears under only three headings in *Index Medicus*. About 45% of the papers are in languages other than English. About 50% of the material is now indexed outside the National Library of Medicine, USA.

The working party was fortunate to have had the opportunity to discuss MEDLARS at the Biomedical Documentation Centre, Karolinska Institutet, Stockholm, and with Dr. Barr, National Lending Library, UK. The Biomedical Documentation Centre, Stockholm, is one of the centres in the international MEDLARS network with the job of co-ordinating the indexing of Scandinavian biomedical literature, for which it obtains in exchange computer retrieval tapes from the National Library of Medicine, USA. The UK MEDLARS service is administered by the Office for Scientific and Technical Information (OSTI) with the National Lending Library being the main centre for the collection of searches. Because of the need to process searches in batches, two to three weeks normally elapse between receipt of a request and dispatch of the output.

Among the periodicals used by MEDLARS for indexing there are very many psychological and some educational periodicals the contents of which, however, are indexed selectively according to biomedical relevance.

INSPEC

The INSPEC project (Information Service in Physics, Electrotechnology and Control) has already been mentioned as one of the first projects in the world "to integrate into a single computer operation the production of a whole range of abstract journals, current-awareness publications and associated indexes" with layout by computer into lines and pages for input into a filmsetter (cf. 18, p. 67). In the planning of the project it was estimated that the system would have to deal with 200,000 abstracts annually by 1972. It now appears that the figure will be 225,000 by 1971. 70% of the abstracts published are written by the authors themselves. The following publications originate from the system:

Physics Abstracts, fortnightly, ca. 65,000 abstracts annually

Electrical & Electronics Abstracts, monthly, ca. 34,000 abstracts annually

Computer & Control Abstracts, monthly, ca. 16,000 abstracts annually

Current Papers in Physics, fortnightly, each containing ca. 2,500 references

Current Papers in Electrical & Electronics Engineering, monthly, each containing ca. 2,800 references

Current Papers on Computers & Control, monthly, each containing ca. 1,380 references

Furthermore it is planned to publish *Cumulative Indexes* every half year, later perhaps every three months.

INSPEC has been fully operational since January 1969. All the publications mentioned above had been published previously by conventional methods and on a commercial basis. The journals are self-supporting. 80% of the subscribers are university institutes.

A number of studies are being carried out in relation to the project, e.g. on SDI (Selective Dissemination of Information), index languages, user needs, back-up services on microfilm, and on-line access to storage.

INSPEC is co-operating with a number of documentation services of other countries to feed their literature into the system.

1.3 *Approaches in international co-operation*

New approaches of UNESCO, based on a resolution passed by the General Assembly in September 1968, might eventually lead towards the development of a world-wide system of educational documentation and information with a reorganised International Bureau of Education, Geneva, serving as its headquarters (cf. 39). The shape this system takes will depend on carefully worked out plans based on systems analysis, on the financial means available, and on the use that can be made of national, regional and other international intellectual effort and resources. With all these important features yet to be settled, any regional planning in this field will have to be flexible enough to take into account UNESCO-IBE developments as well as possible special contributions to educational documentation and information from other international organisations.

UNESCO sponsors another international project under which the possibilities of a world-wide documentation and information system in the field of science and technology are being studied by a committee set up jointly by UNESCO and ICSU (International Council of Scientific Unions) and five sub-committees (Standards for the Transfer of Bibliographical Data; Systems Analysis Studies; International Standards for Abstracts; Analysis, Compression and Organisation of Scientific Information; Indexing and Classification). It seems likely that some studies originating from the work of the ICSU-UNESCO sub-committees could profitably be considered in the development of a world-wide documentation and information system in the field of education.

Though the recommendations of the ICSU-UNESCO committee are still pending, it may be of interest to take a look at proposals for an international system for scientific and technical information made by C. W. Sherwin, chairman of one of the sub-committees prior to the establishment of the ICSU-UNESCO committee. He sees the following four steps in the development of an international system (cf. 26, pp. 1-8):

- "The definition and international voluntary acceptance of a minimal set of International Basic Standards (IBS) designed to permit the efficient interchange of machine-readable surrogates, or abstracts, of technical documents including patents."

- "The voluntary international adoption of a set of Data Elements and definition of an International Standard Abstract (ISA) to be written in machine-language, using the International Basic Standards (IBS)."

- "The establishment of an International Service Organisation . . . and, for each country, a National Service Organisation . . . , to provide technical support for the implementation of the International Basic Standards (IBS), and to provide a basis for the international registry of machine-language codes used in the data interchange systems based upon these standards."

- "The establishment of an International Evaluation Centre Organisation (IECO), associated with the International Service Organisation whose function is to arrange for and co-ordinate on a voluntary basis, the operation of an international system of Evaluation Centres which will eventually cover all fields of science and technology. The function of each centre is to evaluate, compress and organise all of the significant, world-wide, scientific and technical literature in a particular subject area for its more efficient utilisation in science, technology, industry and government."

Sherwin estimates on the basis of present experience that there would have to be about 2,000 Evaluation Centres in a world-wide frame, each employing about five full-time-equivalent professionals, and each evaluating about 1,000 documents per year.

Each of the centres would cost on average $100,000 per year, all 2,000 centres approximately $200 million world-wide.

Though the cost of this system with a maximum degree of decentralisation seems to be very high, it certainly represents a small proportion of the sum invested today throughout the world on inefficient attempts to obtain and analyse data on "an annual production of at least 10^6 significant documents . . . in science and technology . . . produced by world-wide science and technology research effort of approximately 20 billion dollars/year . . . ".

In addition to these overall plans for international systems covering large fields of literature two international projects in more limited subject fields are summarised in the next few paragraphs.

ISIS

The working party was fortunate in being able to discuss the ISIS project (ISIS = Integrated Scientific Information Service) at the International Labour Office, Geneva (cf. 8,15,17,32,36,37), a project inaugurated by the Central Library and Documentation Branch of the ILO in 1963. It is a project in the social sciences field concerning economic and social development including vocational and technical education.

About 8,000 documents are processed under the ISIS project every year by 3½ document analysts, each title containing bibliographical data, descriptors from a well-defined list of about 1,300, as well as descriptors drawn from the context. Only the descriptors from the list are recorded in machine-readable form for subsequent retrieval by computer. The original list of descriptors in English has been translated into French and Spanish. The annotations of the documents do not exceed nine lines of 60 positions each.

The bibliographical and subject information is typed on a paper tape punch machine, corrected, and then rearranged on Flexowriter into the final composition to be reproduced by photo-offset in the form of a weekly current-awareness bulletin *International labour documentation* that can be cut up to make 75 x 125 mm catalogue cards.

Information encoded on the punched paper tape is then transferred to magnetic tape and disc for subsequent handling on an IBM 360/30 computer.

The project is developing its co-ordination with other institutions with an eye to sharing the analysis of literature, and is improving computer programs for the processing of data and for searches.

INIS

Detailed proposals for the INIS project (INIS = International Nuclear Science System) were worked out by a study team over a period of almost four months at the International Atomic Energy Agency in Vienna in 1968 (cf. 24). While computer-aided systems attempting world-wide coverage of the literature of certain subjects have been running for some time, but always under centralised national or regional control, "INIS is the first attempt to internationalise completely both intake and management, and the methods it is exploring will have considerable influence on the future of international documentation" (cf. 24, p. 5).

INIS is designed to handle some 100,000 documents annually. The carrier language of the computer-stored information is English.

Decentralisation is considered by the INIS team "a two-stage problem: the intellectual selection and preparation in a standardised form of bibliographical entries and the conversion of the data into machine-readable form. The former is largely considered to be a national responsibility (under the principle of decentralisation); the latter, mainly for technical reasons, should be centralised or regionalised as much as possible."

The INIS report contains "Rules Recommended for Input" aimed at maximum compatibility. The preferred form of input is magnetic tape with punched paper tape as an alternative. The smaller the producer the more desirable it is that input should be on work sheets sent to INIS headquarters. For the middle seventies, the team considered that optical character recognition would be the most attractive form of input.

The output products are magnetic tapes and printed lists. The lists will have some indexes, but no subject index. Subject searches will be made by using the magnetic tapes.

"Starting from the principle of decentralised input with the imposed necessity for consistency of indexing" the INIS team decided for co-ordinate indexing. They were aware of the consequences, namely that "indexers must have a good subject knowledge and must receive a high level of training". Furthermore "there must be a professional and continuing responsibility for a strongly centralised maintenance of the thesaurus of keywords, alphabetical lists and terminology charts".

In answer to the problem of making full texts available, the team decided on the use of microfiches, which will also carry abstracts not intended to be processed into the system.

The INIS report contains so many carefully worked out details on most problems concerned with the establishment of a functioning international decentralised documentation system that it merits very close examination in similar attempts in other fields, too.

1.4 *Requirements for international co-operation*

In his proposal for an international system for scientific and technical information C. W. Sherwin states "If certain minimal international agreements can be reached soon enough, at least on certain matters - mostly having to do with the essential standards for the mechanisation of information transfer - it is quite possible that the national systems, which will inevitably be developed, will be designed from the start to be compatible with the international system. . . . If, on the other hand, the basic international agreements are not reached soon enough, heavy pressures will force individual countries to develop machine-language systems which may well be incompatible, thus greatly delaying and reducing the mutual benefits of international co-operation" (cf. 26, p. 1). It is to be hoped that essential agreements of this kind might result from the work of the ICSU-UNESCO committee. Although they would primarily affect the scientific and technical community, many of these agreements on standards for the mechanisation of information transfer could presumably be joined by other fields, e.g. education.

Theoretically a distinction should be drawn between centralised and decentralised documentation and information systems, taking into account differences in subsequent requirements for international co-operation. In practice it appears that no fully centralised international documentation and information system exists - except perhaps for EURATOM - although various degrees of sharing of responsibility between system headquarters and evaluation centres, primarily due to the expense of equipment required for processing, storage and retrieval, can be observed. ISIS is also developing towards a co-operative system. For this reason only requirements for decentralised systems for documentation and information are listed below, on the basis of an analysis of projects such as MEDLARS, INSPEC, INIS etc.

Within decentralised computer-based international documentation and information systems agreements have to be reached on:

A. Targets for analysis

- subject scope
- coverage of types of literature and material
- type and depth of analysis, including the handling of abstracts, selection criteria etc.

B. Standards

- format, i.e. rules for bibliographic description
- indexing and classification involving the development of a list of descriptors and/or a thesaurus
- type and media of input

C. Targets for production and services

- output, e.g. lists, tapes, authority files etc.
- SDI (Selective Dissemination of Information), on-line access or other search services
- availability of full texts

D. Management and costs

- distribution of functions among the co-ordinating centres of the system and the other centres

- charges to users

- distribution of costs and revenue

1.5 *The expansion of specialist fields*

It can be gathered from the information available to the working party through visits and studies that there are tendencies towards a further diversification of subject fields, an increase in interdisciplinary fields, and an increase in the need for problem-oriented information, e.g. in the field of educational planning. All three trends lead to the establishment of various documentation and information activities and centres, involving a host of problems concerning the limitation and overlap of subject scopes, interchange of processed data, indexing, retrieval, and management.

The ERIC project, USA (Educational Resources Information Center), now has 19 clearinghouses covering the following fields (cf. 27):

- Adult Education
- Counselling and Personnel
- Disadvantaged
- Early Childhood Education
- Educational Administration
- Educational Facilities
- Educational Media and Technology
- Exceptional Children
- Higher Education
- Junior Colleges
- Library and Information Science
- Linguistics
- Reading
- Rural Education and Small Schools
- Science Education
- Teacher Education
- Teaching of English
- Teaching of Foreign Languages
- Vocational and Technical Education

Considering the needs and activities of educational documentation and information, further specialist fields might easily be added to this list e.g.:

- Art Education
- Extra-curricular Youth Activities and Social Work
- Geography
- History
- Mathematics
- Music
- Physical Education
- Social Sciences

etc.

Furthermore, in Europe, for instance, educational documentation and information needs and activities seem also to centre around certain topical matters, such as:

- Comprehensive Schools
- Correspondence Education, Multi-media Systems, etc.
- Programmed Instruction

etc.

Thus a very tentative list of educational documentation and information needs and activities might range from 25 to over 30 specialist subject fields. Specifically American needs that could be dropped from this list would be balanced by specifically European needs, or those of individual countries.

To allow for these trends of diversification of subject fields, increase in inter-disciplinary fields and of the need for problem-oriented information - which can also be found in fields other than education - requires the use of a general list of descriptors and/or a thesaurus. It also requires, though, the integration of several subject-field lists of descriptors and/or thesauri into the general indexing and classification system, the structure of which has to be flexible enough to reflect the development of individual subject fields. For the analysis of literature this implies the involvement of subject specialists rather than generalists.

1.6 *Costs*

The working party is unable to present at this stage any estimate of costs involved in establishing and maintaining a co-operative computer-based European documentation and information system in education. It would be unrealistic to pretend that this system would require less than or the same expenditure as the present activities. What can be maintained, however, is that a well-organised, co-ordinated and computer-based European system, acting as a partner in an international co-operative system would certainly be much cheaper than the aggregate cost of each individual country satisfying its own needs by means of its own computer-based national educational documentation and information system.

The question of costs cannot be regarded in isolation from their resulting benefits. Considering that member Governments of the Council of Europe are engaged on medium-term and long-term educational planning with accompanying research and evaluation, and with information increasing two-fold in under ten years, their efforts might fail to keep up with the times unless they have resort to a solid body of analysed,

compressed and organised up-to-date information. In its own interest, therefore, each Government will have to establish its own documentation and information system for the continuation and up-dating of its educational planning. Both the necessity for, and the economic advantages of establishing a national documentation system are obvious. The only financial saving that could be achieved would be through the avoidance of analysing, compressing and organising relevant literature from other countries, relying instead on contributions to a shared European and international system. For rapid processing of data and for access to data of other contributors a computer base for such a system is essential.

A similar cost-benefit relationship can be noticed with educational research. The relatively small amount of money spent on educational research - in comparison with its importance - in each country would be even less effective without ready access to information on all national research activities and comparable ones in other countries, the knowledge of which could help to economise on one's own manpower and financial resources.

In addition to educational planning and research, the efficiency of implementing the planning, and of making research results known to administrators, teachers, students, parents etc. in order to stimulate innovative processes, tends to become more and more problematical, jeopardising not only the expected outcomes of capital and manpower investments, but also the prospects of human progress in keeping with a dynamic age. The exchange of experience and of research and information on models in this area on a European and international scale may be of great importance to making investments in planning and research pay for efficient educational innovations.

It is with these three areas (planning, research, and implementation of innovations) in mind that the cost-benefit question of a European documentation and information system should be approached (cf. 21). Though estimates on the cost of this system will still have to be worked out in the initial phase of the project, reference can be made to costs involved in the ERIC project in the United States.

The total ERIC budget for the current fiscal year (July 1969 to June 1970) is $5,000,000 (6). Of this $4,000,000 is spent on 22 Eric clearinghouses, including three new clearinghouses to be established this fiscal year. This means that the average ERIC clearinghouse is being supported at the level of $180,000 per year.

The remaining $1,000,000 of the ERIC budget is spent on "operations support", i.e. computer, microfiching, printing, and technical services. The operations support category includes the contracts for processing of items into the abstracting journal *Research in Education* and into the indexing journal *Current Index to Journals in Education*, the contract with the National Cash Register Company (NCR) for the operation of the ERIC Document Reproduction Service, printing costs, and evaluation or systems development and improvement activities. This fiscal year's budget includes only between $100,000 and $200,000 for systems development and implementation as the building of the basic operating network into an integrated system had already been accomplished during previous years.

The current subscription revenue for *Research in Education* - the *Current Index to Journals in Education* was first issued in June 1969 - is about $80,000 annually and goes to the US Superintendent of Documents and not to ERIC. The revenue for all reports sold, about $1,300,000 annually, is retained by NCR for operating its non-profit service of producing and distributing hard copies or microfiches. (7)

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(6) From a letter from Lee G. BURCHINAL to the rapporteur, dated 26th September, 1969.

(7) cf. 27 for further information on ERIC.

Besides the above figures on the ERIC project, the cost estimates for bibliographical searching as presented by Thompson for the ISIS project (cf. 37) "although some of these figures should probably be taken with a grain of salt, . . . are indicative of an order of magnitude". Including data preparation costs Thompson arrives at from $9.01 per computer search (in batches of 15 per day) to $7.50 (in batches of 20 per day) and $5.26 per search (in batches of 40 per day). These costs include shares in the developmental costs of the system, in data preparation costs, in hardware costs as well as computer time, staff time to formulate questions on terminals and computer time to print results. With comparable manual searches - but not valuing the catalogued data - Thompson arrives at $65.00 per search. This figure includes only staff time for searching bibliographies, files etc. and for typing results.

The cost estimates concerning computer searches relate to the operations of one documentation service only. "The cost can be further reduced", Thompson continues, "by envisaging the creation of an information network. An on-line network would have the advantage of enabling participating institutions to cut down on traditional costs in the acquisition and processing of materials by avoiding duplication of work at the input stage. A division of labour would also enable a much larger information store to be built up, thereby lowering the cost to each participant of data preparation. Furthermore developmental costs for the computer system could be shared. This would be particularly beneficial for the further improvements in the system that will be necessary to keep apace with technological and other changes."

In concluding this sub-chapter on costs, reference is made to an extensive Canadian user study among scientists, engineers, and technological managers (cf. 37). It was found that this group spends about 15 per cent of its time manually searching for scientific and technological information, amounting to more than $1,800 per person annually. Applied to the 120,000 such professionals in Canadian industry, salary costs alone for those searches exceed $200 million annually.

It may be assumed that user studies in the field of education would reach similar results, provided that the call for information among educators in Europe has not already been stifled by the frustrations of insufficient information services in this field.

1.7 *Trends in the development of documentation and information*

With the help of electronic data processing machines the automation of documentation and information is taking place in three areas. The first concerns documentation per se, that is processing, storage, and retrieval of information. The second area covers attempts to overcome language barriers by the development of techniques for the automatic translation of natural languages, and the third area is that of photo-setting to speed up processes of preparing computer output for printing. In addition to these primary fields of development, a great variety of possibilities for the adaptation of computer techniques can be found, particularly for the improvement of library management and services.

Though aware of the great impact of automatic translation of natural languages on a European educational documentation and information system, the working party was not able to study this aspect but feels that developments here should be followed closely.

As regards the third development area of automatic documentation and information, the party was fortunate to be given details of INSPEC (Information Service in Physics, Electrotechnology and Control), one of the first projects in the world "to integrate into a single computer operation the production of a whole range of abstract journals, current-awareness publications and associated indexes" with layout by the computer into lines and pages, and coded for input into a filmsetter (cf. 18, p. 67). The INSPEC example proves that it is possible even today to start from a "once-and-for-all" intellectual effort in the analysis of literature and with the help of a computer and elaborate programs put this effort to optimal use for a variety of purposes with publications set in type faces no different from those of normal bookprint.

It will be clear that in the visits and meetings of the group and in the Technical Studies and National Reports the emphasis is on the first area of development in automatic documentation and information, that of processing, storage, and retrieval of information and in the use of computers for library management and services.

The problem areas the working party found in this field concern adequate processing and storage of data for the production of current awareness lists and for retrieval, and the prior elaboration of a thesaurus. Developments in the solution of these problems are of crucial importance to the practical implementation of documentation and information and will be discussed in chapter three.

As to future technological developments in documentation and their subsequent organisational consequences and sociological implications the working party found it hard to make any reliable extrapolations. A number of factors, however, may have to be closely investigated.

New generations of computers would have enlarged storage capacity, more suitable for their economical use in documentation.

The Unicon process, i.e. the storage of 645 million bits on a square inch of tape via laser with both input and output speeds of 12 million bits/second, could represent the missing link between computer and document.

On-line access to computer storage via satellites could in future replace the exchange of tapes.

The improvement of machine translation of natural languages can be expected from the combined efforts of computer specialists and linguists in the USSR, the USA, and in Europe.

Photo-setting by computer has already been achieved in several countries.

On the organisational and physical side, network studies are being carried out by EDUCOM, USA (Interuniversity Communications Council EDUCOM), for an EDUNET (cf. 4) connecting data storages of central libraries, universities and colleges, and by VINITI, USSR (cf. 28).

All such technological developments with ensuing social consequences for instruction and research have tc be closely followed and analysed from the point of view both of their economics and the priorities to be established in the development of an educational documentation and information system which cannot be seen in isolation from developments in other fields.

2 CONCLUSIONS

On the basis of their visists and discussions and by analysing the available material the working party came to the following conclusions:

(i) Educational documentation and information are generally considered a vital prerequisite for educational development and innovation in Europe. Present arrangements, however, do not adequately meet the needs of policy makers, researchers, administrators, teachers and others concerned.

(ii) Technological developments in automatic documentation have for the first time made it possible for a "once-and-for-all" intellectual effort in the analysis of documents made at one place to be used by a theoretically unlimited number of other centres and users, provided that these centres co-operate at regional level to develop common targets for analysis, common standards, and common targets for production and services. In this way inefficient handling of data at innumerable places and centres, duplication of work and consequent waste of money can be avoided.

(iii) The working party proposes the creation of a computer-based European Documentation and Information System for Education (EUDISED), in the geographical region covered by the member States of the Council for Cultural Co-operation. This should proceed in three phases. The working party therefore submits proposals for a short-term plan up to 1975, for a medium-term plan after 1975, and perspectives for long-term development.

(iv) EUDISED should be considered as a regional system within the framework of the emerging world-wide educational documentation and information system under the sponsorship of UNESCO.

(v) EUDISED should not be a centralised system but decentralised, as the available data on international systems already in operation or being planned prove the advantages of decentralisation.

(vi) The efficiency of any decentralised system primarily depends on the quality and appropriateness of rules commonly adopted and observed, the distribution of functions among the co-ordinating centre(s) and the participating centres, and the efficiency of each participating centre.

(vii) Particularly during the initial phase of the development of EUDISED, member States should concentrate on the modernisation, expansion and reinforcement of their own national centres and systems, so that they can develop into efficient partners, co-operating both nationally and internationally.

(viii) Specialised centres will be on the increase, at the national and international level. The working party conceives of chains of such centres specialised in a particular subject field of education and co-operating regionally within EUDISED.

(ix) The working party suggests the co-ordination of national documentation and information systems and/or specialised documentation centres in each particular language area, such as English, French, German, Scandinavian etc.

(x) EUDISED should be developed as a network based on national documentation and information, on language area co-ordination, and on co-operating chains of specialised documentation centres in the field of education.

(xi) Considering the great number of different languages spoken in the member States of the Council of Europe and aware that machine translation of natural languages is not yet a practical possibility, the working party suggests that for technical and organisational reasons English should be the carrier language of computer-stored information within EUDISED.

(xii) The working party proposes the establishment of a steering group for EUDISED, composed of experts from national centres and international organisations, to guide all activities concerned with its implementation in phases 1 to 3 and its co-operation in a world-wide system. The steering group should report to member Governments at regular intervals.

3 PLANS AND PERSPECTIVES

The following proposals are not intended to represent a detailed plan of action. Rather, they indicate possibilities for action provided agreement can be reached on the phased development of EUDISED. The working party conceives of the development of EUDISED in three phases, not only for financial reasons but also because of the time it will take to develop EUDISED carefully as a decentralised functioning network based on national documentation and information systems for education, on language area co-ordination, and on co-ordinated chains of Specialised Documentation Centres in the field of education.

Under 3.1 proposals are made for immediate implementation for the first phase up to 1975. A medium-term plan (phase 2) involving proposals for the period from 1975 up to the establishment of a functioning European network is described under 3.2. Finally, perspectives for a long-term plan (phase 3) are given under 3.3.

While a completion date can and should be fixed for the implementation of the first phase, it can not for the subsequent phases. Their implementation will largely be influenced by the extent to which the targets of the first phase are reached. This will in turn depend primarily on the initiative and co-operation of European countries.

3.1 *Short-term plan*

The proposals made in this section concern minimum requirements for European countries co-operating towards the development of EUDISED. These requirements should be met by 1975. It is not suggested, however, that activities in the field of educational documentation and information should be held back to the level proposed for 1975. On the contrary, all further reaching experiments nationally or regionally should be encouraged so that the planning of the second and third phases may profit from the experience gained from them.

The minimum requirements to be met by 1975 for the preparation of EUDISED are:

(i) The further modernisation, expansion and reinforcement of national and language area documentation and information services for education by working out and implementing development plans similar to those in the field of science and technology.

Without modernisation, expansion and reinforcement of these resources through co-ordinated planning with other fields in the social and behavioural sciences, no quality input into EUDISED or into a world-wide UNESCO system can be expected nor can these services be of great use.

These tasks are the responsibility of member Governments.

(ii) The training of personnel in computer-based documentation and information techniques both nationally and regionally.

(iii) Preparation of specialised national and regional educational documentation and information services to become partners in a regional and international co-operative system.

(iv) Establishment of the EUDISED steering group to gather and keep in evidence information on national and international projects, co-ordinate activities, advise member Governments if so requested, report to them at regular intervals, and prepare the next phase by proposing further studies and surveys to be commissioned.

The steering group will also have to pay particular attention to problems of technical compatibility of computers, in co-operation with other international bodies active in the field of documentation.

For the benefit of the steering group and the planning of EUDISED, certain targets should be set even in this first phase of modernisation, expansion and reinforcement of national and language area resources. The following paragraphs deal with tentative proposals as far as they could be discussed and agreed upon by the working party, and point to some problem areas met.

3.11 *Systems of co-operation*

On the basis of available material and from discussions the working party held with specialists from various countries, it became obvious that European co-operation in the field of educational documentation and information could both increase the quality of relevant data and save labour and money for every country participating, provided that each strove to reach a high standard in its own system for quality input into the larger one.

It should be noted in this respect that up to now information on educational developments has primarily been communicated only between countries in the same language area, there being little external communication. This communication gap must be overcome.

EUDISED should be considered as one of a number of regional systems within a UNESCO sponsored world-wide educational documentation and information system. In connection with EUDISED's co-operation with UNESCO, the working party suggests that:

- A working party should be set up by UNESCO-IBE, composed of experts from the existing or planned systems (North America, EUDISED, Eastern Europe and other regions) to exchange information regularly and to achieve harmonisation in such technical matters as systems' interconnection, common standards for format, thesaurus, analysis, selection, and information transfer.

- Close collaboration should be maintained in the editing of educational abstracts.

- A selection of important educational documents, e.g. from the USSR and other Eastern countries, should be translated by UNESCO-IBE and made available.

Within this world-wide system, co-ordination should be arranged with other available international documentation services also covering the field of educational documentation and information.

On the basis of its present assessment of educational documentation and information activities, and considering the trends towards diversification and expansion of subject-fields, an increase in interdisciplinary fields, and towards problem-oriented documentation and information, the working party suggests that the following system elements should be taken into consideration in planning EUDISED.

<u>Local or institutional level</u>

Educational libraries (public or non-public)

and any other relevant facilities

<u>National level</u>

Specialised Documentation Centres (SDCs) for education

National educational documentation and information system

Co-ordinating centre of the national documentation and information system

Language area level

Language area documentation and information system for education

Co-ordinating centre of the language area documentation and information system

European (or regional) level

European Documentation and Information System for Education (EUDISED)

EUDISED Co-ordinating Centre (preferably at the Secretariat of the Council of Europe)

Co-ordinating centres for chains of specialised documentation and information centres

Furthermore EUDISED should be seen as one of the regional systems in a world-wide UNESCO sponsored educational documentation and information system.

The accompanying diagrams illustrate the links between these various elements.

Fig. 1 shows the relationships within a national system. Some Specialised Documentation Centres (SDCs) will be set up in connection with a public or non-public educational library.

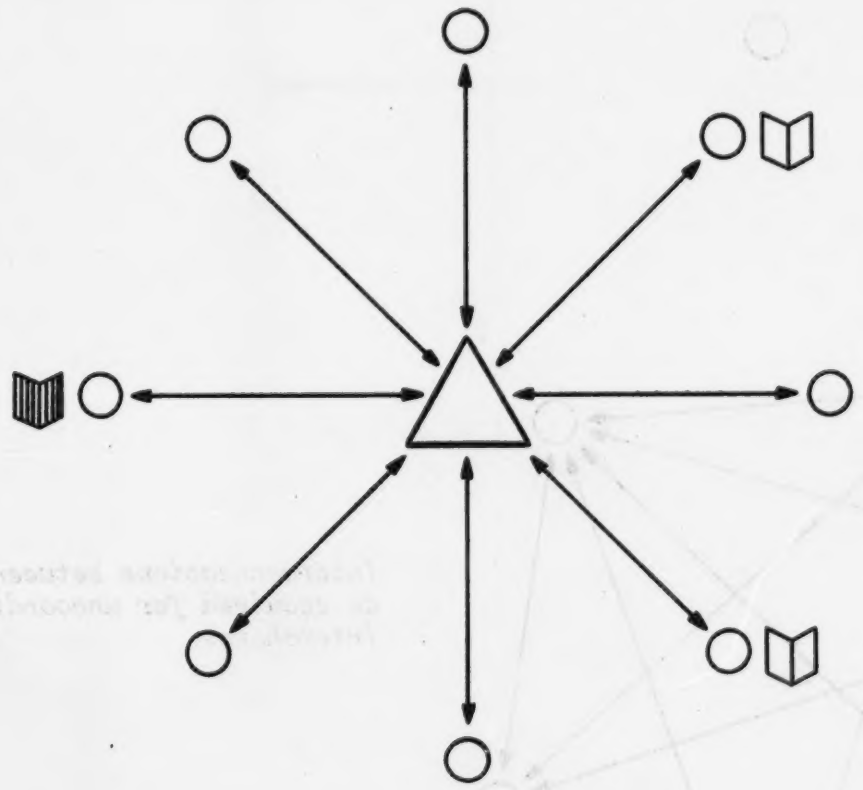
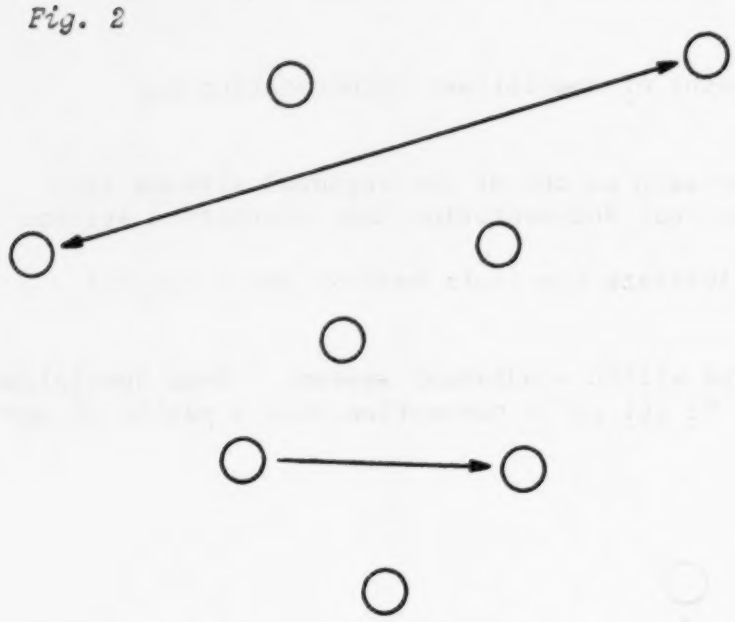

Co-ordinating centre of the national documentation and information system
Specialised Documentation Centre (SDC)
Public educational library
Non-public educational library

Fig. 1: Relationships within a national documentation system for education

Figs. 2 to 4 represent three different stages in the co-operation between SDCs of different countries, fig. 2 indicating the present mode of possible interchange, fig. 3 the connections required for all SDCs in a given subject field to be in interchange, and fig. 4 a co-ordinated, chain of SDCs, one of which acts as co-ordinating centre.

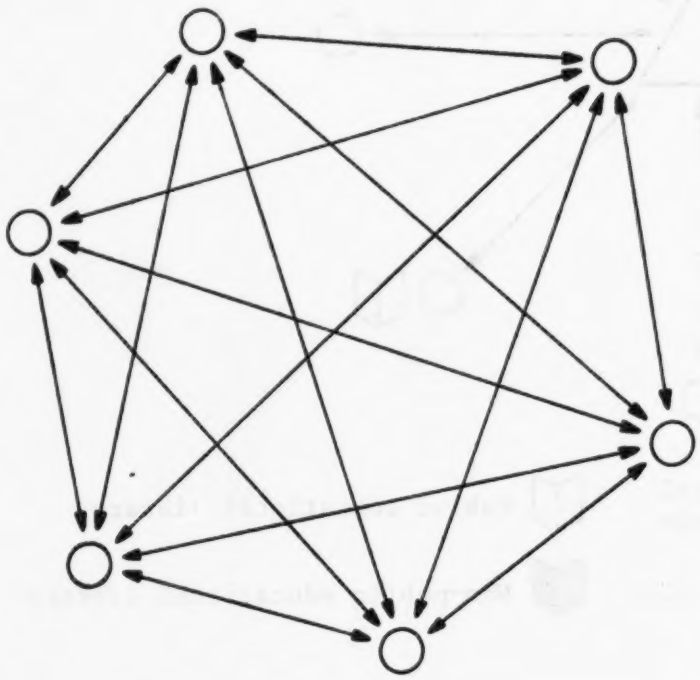
Fig. 5 illustrates the possible relationships within EUDISED.

Fig. 2



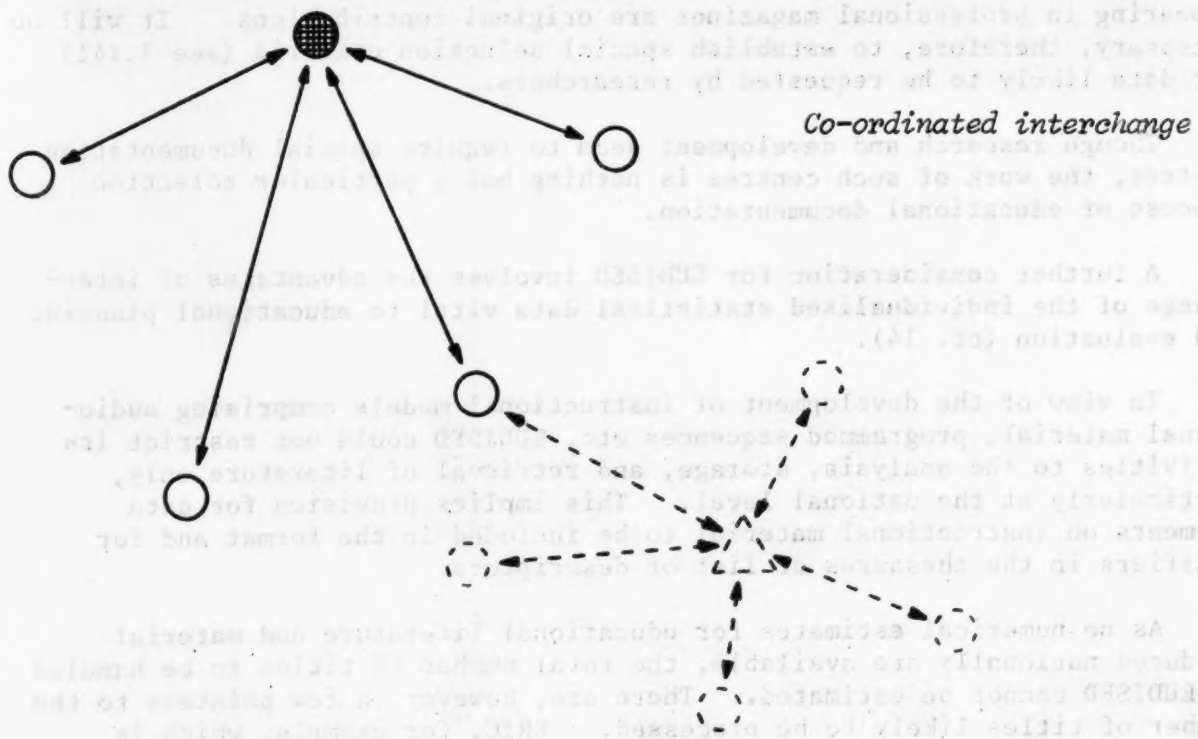
Present mode of interchange between SDCs

Fig. 3



Interconnections between SDCs as required for uncoordinated interchange

Fig. 4



As can be gathered from fig. 5, an SDC co-ordinating centre could serve as an element in its national system while at the same time co-ordinating the activities of a regional chain of specialised centres.

As the volume of specialised literature will differ from country to country, institutes or individual researchers from those countries in which no SDCs could be established would nevertheless be in a position to contribute to and participate in specialist field interchange.

The justification for considering the inclusion of SDCs in EUDISED has been touched on under 1.5.

3.12 *Targets for analysis*

Three main questions concerning the targets for analysis will have to be settled through studies and by common agreement:

- **subject scope**

- **coverage and types of literature**

- **type and depth of analysis, including the handling of abstracts**

3.121 *Subject scope*

As multi-disciplinary approaches are on the increase in education, calling not only for contributions from educational psychology and educational sociology but from many other fields as well, educational documentation and information must be considered as a part of social science documentation as a whole. It may, therefore, be advisable to follow developments in the tendency to integrate documentation activities in this field in order to save money and labour through the co-ordination of efforts. This may be particularly relevant at the national level. To this extent educational documentation and information cannot be considered in isolation from developments in broader fields.

EUDISED should be of particular benefit to educational research and development. General experience indicates that only 10% of the articles appearing in professional magazines are original contributions. It will be necessary, therefore, to establish special selection criteria (see 3.141) for data likely to be requested by researchers.

Though research and development seem to require special documentation centres, the work of such centres is nothing but a particular selection process of educational documentation.

A further consideration for EUDISED involves the advantages of interchange of the individualised statistical data vital to educational planning and evaluation (cf. 14).

In view of the development of instructional models comprising audio-visual material, programmed sequences etc. EUDISED could not restrict its activities to the analysis, storage, and retrieval of literature only, particularly at the national level. This implies provision for data elements on instructional material to be included in the format and for modifiers in the thesaurus or list of descriptors.

As no numerical estimates for educational literature and material produced nationally are available, the total number of titles to be handled by EUDISED cannot be estimated. There are, however, a few pointers to the number of titles likely to be processed. ERIC, for example, which is concerned only with educational research and research related material, lists and abstracts about 10,000 titles annually, and this total includes neither books and periodical articles nor documents retained by the ERIC clearinghouses "worthwhile for people in certain specialised areas but not nationally significant" (cf. 27). The *Bibliographie Pädagogik* lists about 10,000 titles annually including books and periodical articles. 17% of the titles are foreign literature. The *Bibliographie Programmierter Unterricht* which selects both German literature and literature from abroad on this subject (about 65%) registers some 2,500 titles annually.

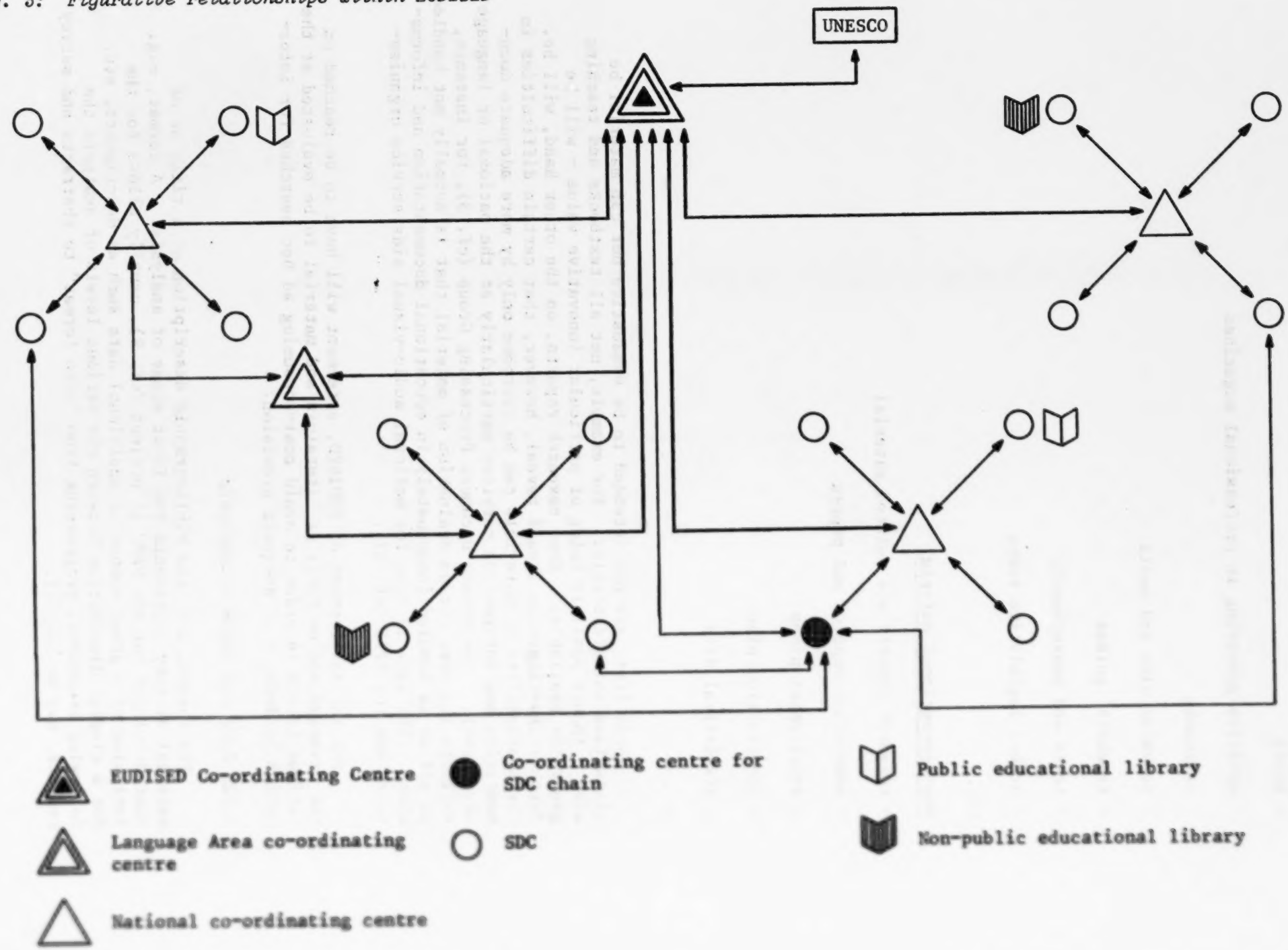
Considering the activities of ERIC and taking into account the considerable output of educational literature in the USSR, Japan and many other countries, a very vague but conservative estimate might lead to the assumption that at present between 120,000 and 150,000 titles might have to be evaluated and compressed annually throughout the world, with the European share ranging between 50,000 and 70,000. Trends towards a further increase in volume are obvious.

The quantity of literature and material to be evaluated, compressed, and organised is certainly a function of the subject scope agreed upon for education. Theoretically this subject scope could be limited to certain areas. The field of education, however, is not adequately covered by, for instance, the texts of school laws, bills, decrees etc. but must both be seen against the broader background of the social and behavioural sciences and yet comprehend such matters as school buildings, other facilities, media and materials etc. As innovation tends to become more and more of an interdisciplinary activity, limitations of any kind would cripple the utility of EUDISED as a tool for educational planning and reform. The subject scope for education should, therefore, be broadly defined (see 1.4).

3.122 *Coverage and types of literature*

The working party suggests that a distinction be made between conventional and non-conventional material on the basis of their general availability.

Fig. 5: Figurative relationships within EUDISED



Conventional material

- books
- articles appearing in professional magazines
- textbooks
- teaching aids and media
- teachers' guides
- tests and measurements
- school legislative texts

etc.

Non-conventional material

- research reports and related material
- innovation reports and papers
- development plans
- construction plans
- statistical data

etc.

These lists are not intended to be exhaustive nor can material be classified satisfactorily. For example, not all textbooks and teaching aids - though possibly being of particular innovative value - will be generally available. Some research reports, on the other hand, will be. Further investigation should reveal, however, that certain difficulties in the availability of materials can be overcome only by more adequate documentation and information services particularly at the national or language area level. The French Document Processing Group (cf. 3), for instance, reflects the need for an evaluation of material that is normally not handled at all or is handled inadequately in educational documentation and information. The same is true for national audio-visual aids service organisations and for EPIE (cf. 27).

For the development of EUDISED, agreement will have to be reached on the coverage and on types of literature and material to be evaluated at the various levels in order to avoid cost-consuming ad hoc searches for information in default of adequate provision.

3.123 *Type and depth of analysis*

The format, i.e. the bibliographic description of a title or of material already represents the first stage of analysis. A format, e.g. that developed for the MARC II project (cf. 9), usually allows for the inclusion of a great number of additional data such as descriptors, etc. For a clearer distinction between the various levels of analysis the following breakdown, progressing from "core format" to abstracts and survey reports, may be helpful.

A-level

"Core format", i.e. bibliographic description of title excluding classification and descriptors.

B-level

B-level I

"Core format" + either classification

or descriptors from a controlled vocabulary

or textwords and/or free descriptors.

B-level II

"Core format" + two elements out of three

(classification, descriptors from a controlled vocabulary, textwords and/or free descriptors).

B-level III

"Core format" + classification

+ descriptors from a controlled vocabulary

+ textwords and/or free descriptors.

C-level

C-level I

"Core format" + classification

+ abstract

C-level II

"Core format" + classification

+ abstract

+ either descriptors from a controlled vocabulary or textwords and/or free descriptors.

C-level III

"Core format" + classification

+ abstract

+ descriptors from a controlled vocabulary

+ textwords and/or free descriptors

D-level

survey reports

or trend reports

or progress reports

The working party suggests that A-level analysis should be done by personnel trained in library techniques. For all further levels of analysis it seems to be essential to involve subject field specialists in the analysis in order to ensure that the output of EUDISED keeps apace with dynamic developments in specialised fields.

B-level I analysis ("core format" + classification) is considered adequate for most Union Catalogues and current-awareness lists, e.g. the *Union Catalogue of Foreign Literature in Swedish Research Libraries* (cf. 13), the INSPEC current awareness publications (cf. 18), and the INIS project (cf. 24).

B-level II analysis ("core format" + classification + descriptors from a controlled vocabulary) was originally planned for the *Bibliographie Pädagogik* (cf. 29) but was soon displaced by B-level III analysis including free descriptors on account of the time-lags in the publication of new authority lists. With the help of computers, the authority file and lists could be up-dated faster. B-level II analysis is used by MEDLARS (cf. 19, 38) and by the Document Processing Group of the Institut Pédagogique National, Paris (cf. 3).

C-level I analysis is used e.g. for the INSPEC abstract services (cf. 18).

As far as projects mentioned in this report are concerned, C-level III analysis is employed by ISIS (cf. 36, 37) and ERIC (cf. 27).

The inclusion of abstracts in a documentation and information service does not necessarily mean their availability in the computer storage. Abstract files and distribution of abstracts can be an off-line process, as it is for instance with the INIS project (cf. 24, p. 30). The compression of literature into an abstract, however, will be very costly unless the custom can be established of authors supplying abstracts along with their manuscripts. This custom can be found in science and technology, thus INSPEC can rely on authors' abstracts for 70% of its abstract services.

If EUDISED should plan to include an abstract service, both the INIS and the INSPEC examples ought to be considered.

It appears to the working party that although the analysis of documents and other material by way of bibliographies is certainly a necessary basic approach in all European language areas and fields of education, bibliographies should be enriched to at least B-level I in order to increase their informative value.

In considering the possibilities of abstracting services, the working party felt that although abstracts may be well established and of particular importance in certain fields, the cost of any newly launched European project of this type may be very high. In preference it was concluded that the production of survey reports (D-level) in priority areas, determined by European agreement, would be of more value to the efficiency of EUDISED, given the doubling of publications every ten years.

3.13 *Common standards*

In order to avoid the inefficiency of accumulating data in a form that is not interchangeable with data accumulated elsewhere, it will be necessary to observe certain standards both nationally and at the European level. Attempts should also be made to try to ensure conformity with standards of non-European educational documentation systems.

The technical norms and standards essential for the functioning of EUDISED mainly concern the mechanisation of information transfer. The following standards for the analysis, storage, and retrieval of documents and material will have to be developed and observed by mutual agreement: standards for lists of descriptors and/or thesauri and their equivalents in different languages, standards for the type of analysis documents and other material are to undergo, the selection criteria to be used for exchange of data between documentation centres at different levels, and standards for the exchange media e.g. microfiches. Further standards may be desirable, e.g. standard format.

3.131 *Standards for the mechanisation of information transfer*

Suggestions for international standards for the mechanisation of information transfer might be expected from the ICSU-UNESCO committee for documentation and information in science and technology, and could presumably also be adopted in other fields. Their effect on computer compatibility remains to be seen.

The pursuit of computer compatibility may not be a worthwhile aim for those whose activities are limited to one region in which a particular type of computer prevails. It is of concern, however, to all trying to co-operate internationally in order to save labour and expense through interchange in the field of documentation and information. Recent technical developments in the production of hardware as well as of software should provide various solutions to this problem (cf. 22, for details). This point is of great importance in the planning of EUDISED, since by the time it is launched, national computerised systems for education will already be in operation.

For the preparation of computer input, most of the centres the working party visited prefer paper tape punched on Flexowriters. Developments in this field, e.g. the preparation of tapes that can be read into a computer at higher speeds, should be closely followed.

3.132 *Format*

Turning to standards outside the sphere of technology, the working party discussed format at some length. Many years of effort have now been put into the development of a machine-readable record both by the Library of Congress and by the British National Bibliography (cf. 9). Similar projects have been developed in other European countries, primarily for the production of Union Catalogues by computer.

At this stage of development, however, there seems to be no chance of early agreement on an international machine-readable format. In default of this, reformatting programs, e.g. that of the Royal Institute of Technology Library, Stockholm (cf. 33), have to be developed to make input from different formats compatible. As it appears that some hope still remains for an eventual international agreement on a standard format, and as reformatting programs have proved to be usable, the working party proposes that a format be worked out for EUDISED which would stipulate the minimum requirements as to the elements it should contain, but have no fixed sequence of elements.

3.133 *Classification and indexing*

The classification and indexing to be used by EUDISED as a decentralised system was of particular concern to the working party, and will need some further discussion hopefully leading to an agreement on this very essential standard (cf. 7 and 30).

The working party was confronted with the following problems when discussing the possibilities of a classification and indexing system for EUDISED:

- There are over a dozen different languages spoken in the member States of the Council of Europe.

- Even the same educational terms in one language differ in their meaning among countries belonging to the same language area.

- The dynamic development of specialised fields in education as well as of interdisciplinary fields and of problem-oriented documentation requires that the terminological developments in these fields be taken into account by the admission of several special thesauri.

- On the other hand a well-structured and flexible general thesaurus will be necessary to establish interrelationships between different specialised fields.

- A free-text system is technically possible but would result in more expensive computer searches than a system controlled by a word list.

- Studies on failures in indexing systems show that the majority of failures are due to the unsuitability of traditional library classification systems (e.g. UDC) particularly for indexing in the social sciences (cf. 5, p. 49).

- The development of a thesaurus and the integration into it of several specialised thesauri might take between five and ten years.

Considering these problems and the results of special studies on thesaurus problems in the field of education (cf. 7 and 30) the working party proposes that the *Information Retrieval Thesaurus of Education Terms* by Barhydt, Schmidt, and Chang (cf. 1), which has been carefully worked out over a period of eight years, be tested for its usefulness as a general thesaurus for EUDISED allowing for several special thesauri to be integrated. In this connection it should be mentioned that previous trials of the first edition of the *ERIC Thesaurus* (1966) in France failed to be satisfactory. The second edition (1969) has not yet been tested, and it should be one of the tasks of the EUDISED Steering Group to launch such testing also.

3.14 *Targets for production and services*

Up to now information vital to educational innovation has had to be obtained by each country individually in an ad hoc attempt at gathering all relevant data from various other countries and sources. It has very often been the case that several countries were each trying to obtain the same sort of information from the others. EUDISED should be seen as a sufficiently adaptable basic instrument to supply data required on certain innovations and problems according to a priority schedule worked out by the Conference of European Ministers of Education.

It seems clear, though, that the EUDISED output of bibliographies, abstracts, and survey reports or combinations of these will not be of immediate service to the majority of educators - teachers and other persons concerned with educational development. It will fall to the initiative of individual member States to develop more readable material or to use other channels of communication to reach these groups.

There is a further aspect of educational information, that of more efficient information transfer for the application of innovations by models of planned change. This aspect could not be dealt with by this working party. Its importance seems to be increasing, however, and might merit closer investigation by another group.

The production and output targets of EUDISED will need to be specified for every one of its various elements, including selection criteria for the exchange of data between documentation centres at different levels. They would also concern EUDISED's responsiveness to enquiries and its handling of searches and full texts.

3.141 *Output*

According to its speciality each Specialised Documentation Centre (SDC) would be involved in the evaluation, compression, and organisation of information in its field at national level. On the basis of its storage it would keep its users informed by bulletins, accession lists or newsletters and might also publish periodical or ad hoc bibliographies and abstracts, survey reports and studies and answer individual queries or prepare packaged-type responses, or it may confine its activities to only a few of these information activities.

At the national or language area level a group of SDCs might contribute to an educational bibliography each from its particular field. For the benefit of educational libraries in a certain country or area a title service on cards may be considered together with the bibliography project.

Even where SDCs already exist, all the above activities are very rare as these centres have to devote most of their energy to searching for and analysing literature from other countries for relevant information in their field in addition to the literature of their own country. With a chain of SDCs co-ordinated at the European level, at least the necessity for each centre to look for relevant literature from other European countries would be overcome.

Another function so far largely absent from documentation centres that could profit from the division of labour mentioned above would be that of the compression and selection of literature. This leads to the question of selection criteria, that is to say what kind of information on a particular educational field should be selected for the information of users other than specialists in that field. The working party suggests three main bases for selection of material for national, regional or international compilations:

- comprehensive current awareness lists of research in the particular field and country,

- lists and/or reports on innovations in the field and country concerned to be judged as such by the specialists of the SDC, and

- survey reports compressing information of individual publications and material.

Other important data, for instance that required for educational planning, might be selected according to priorities established ad hoc by the national system, language area system or EUDISED Co-ordinating Centre in agreement with national or regional priorities.

3.142 *Enquiries and searches*

The national or language area systems should be able to prepare pre-packaged responses to enquiries on the basis of user studies in their areas. Special enquiries, however, would have to be referred to specialised centres.

The question of searches in a computer-based documentation and information system turns on the computer storage available. It will have to be established through systems and network studies which would be the best physical location for what kind of computer in a network. For the first phase in the development of EUDISED, experiments with computer-based documentation and information should be carried through wherever possible.

Experiments should be encouraged, too, with Selective Dissemination of Information (SDI) to acquaint users with new information techniques (cf. 32).

3.143 *Availability of full texts*

As well as exercising the functions of evaluation, compression and organisation of educational literature and information on material, EUDISED must not ignore the need for making full texts, in addition to their surrogates, available at the various centres co-operating in the system. It may be of interest to consider as an example the policy of ERIC on this matter (cf. 27). However the developments in new techniques in the exchange of full texts must be continually examined.

Within the ERIC system a special agency, the ERIC Document Reproduction Service, operating on an Office of Education contract with the National Cash Register Company, provides the physical dissemination of microfiches or hard copy. The ERIC Document Reproduction Service, or specifically NCR has to put almost 10,000 documents onto microfiches annually, and handles all requests for microfiches and hard copy. The full texts of all entries in *Research in Education* are held on microfiches.

The selection of entries to appear in *Research in Education* and put on microfiches breaks down as follows: of every 3,000 research papers and related documents examined by an ERIC clearinghouse, 1,000 are not acceptable. They may be only of local interest, their methodology may be poor or their descriptive material too superficial. A further 1,000 documents fall into a different category, being worthwhile for people in certain specialised areas but not nationally significant. These would be documents to be kept by the specialised clearinghouse rather than being included in Central ERIC storage and publications. The remaining 1,000 will be included in the central system, i.e. consequently put on microfiches totalling almost 10,000 annually.

This example from the ERIC system should be helpful for elaborating plans for the handling of full texts in EUDISED in order to make non-conventional material available both at the national and at the regional levels.

3.2 *Medium-term plan*

By the time the medium-term plan from 1975 to the establishment of EUDISED as a decentralised functioning network begins, the following should have been achieved:

- National and language area systems should have been modernised, expanded, and reinforced as diversified computer-based documentation and information systems serving the needs of their respective area.

- Adequate experience should have been gained on the division of labour among co-ordinated chains of specialised centres.

- Agreements should have been reached, preferably internationally and not confined to the field of education, on

  targets for analysis, e.g.

  subject scope

  coverage and types of literature

  type and depth of analysis

  common standards, e.g.

  standards for the mechanisation of information transfer

  format

  thesauri

targets for production and services, e.g.

output at various levels

enquiries and searches

availability of full texts

- A co-ordination programme for EUDISED and the UNESCO-IBE sponsored world-wide documentation and information system should have been established.

In addition to and in consideration of the above points it will be essential to work out a detailed plan for the implementation of EUDISED's second phase. This plan would have to specify users and user needs based on careful breakdown and analysis. It would have to describe the system's elements, their organisational relations and their technical requirements. Furthermore the plan should contain detailed cost estimates and agreements on the distribution of costs together with a cost-benefit analysis and other items.

It can be expected that by that time - on the basis of previous experience and pilot projects - a number of member States of the Council of Europe will be ready technically to co-operate. Other countries should be able to participate as observers.

The second phase of EUDISED might then broadly be conceived as a phase of development of a functioning EUDISED, with the gradual full participation of all member countries in the project. While it can be assumed that during the first phase of EUDISED a number of pilot projects will have been carried through and evaluated, the second phase would mean field-testing these various models with the intention of finding optimal methods of co-operation in the analysis, compression and organisation of literature and of information on other material.

The most important aspect of this field testing may be keeping EUDISED user-oriented and avoiding the "GIGO effect" (garbage in - garbage out) in the system by constant control of selection procedures. Furthermore various ways of compressing information into machine-readable form will have to be tested. It may well be that by that time the efficiency of information dissemination could be made to fit tested implementation and innovation models.

Great attention will also have to be paid to word list control to facilitate the recovery of data of specialised documentation centres for more comprehensive surveys serving mission-oriented or interdisciplinary output.

The degree to which centralisation or decentralisation of data processing would be feasible nationally, regionally or internationally would necessarily depend on the technology available by then or on trends susceptible of extrapolation.

Technical capability as well as economic considerations would also govern decisions on making use of or alternatively not making use of on-line possibilities within parts or the whole of the network for retrieval or enquiries. The same factors would also decide the degree and the vehicle by which full texts would be made available.

As many of the organisational decisions are interdependent with technological and scientific advances, it is obvious that the working party cannot at this stage offer more than general remarks concerning the second phase of EUDISED. The examples mentioned above are intended only as illustrations of areas in which field testing should be pursued with the object of finding optimal means of co-operation for the establishment of a fully functioning EUDISED.

3.3 *Long-term perspectives*

EUDISED is conceived as one of the regional educational documentation and information systems to be developed within a world-wide system sponsored by UNESCO-IBE. The aim of both the world-wide and the regional systems is to evaluate, compress, and organise literature and other educational material for information purposes. During its second phase EUDISED would become a network. There may be, however, more extensive concepts of networks incorporating the targets of EUDISED. In order to illustrate these types of network as one of our long-term perspectives, reference is made to EDUCOM, USA (cf. 27) with its concept of an EDUNET.

The Interuniversity Communications Council, EDUCOM, was founded in 1964 to disseminate information about new technologies in the communication sciences and gradually to develop a network linking the participating universities for the transfer of data, voice and images, including full texts of documents, in order to make better use of storage capacity and human resources. Among the objectives of EDUCOM are:

- to share library resources by making retrieval of bibliographic citations, abstracts, and full texts possible at any terminal throughout the network,
- to share human resources through the preparation of instructional material, television lectures, and live 'tele-conferences' enabling professionals to be freed from rote lecturing and to meet with small groups of students,
- to overcome the disparity between library facilities by a network providing a more uniform dissemination of information throughout the country,
- to save students and scholars much time by making citations, abstracts, and full texts provided from the comprehensive storage capacities of the entire system available even at remote terminals thus effecting changes in scholarly behaviour,
- to facilitate long-distance interpersonal interactions,
- to provide better bibliographic services: "If the tasks of putting in information were divided among several individuals or institutions on the network, costs could be made reasonable for all concerned and materials could be kept current within days or hours in networks with computerised information storage and retrieval systems and data banks",
- to facilitate permanent education by making it possible for terminals of a network in operation to be installed in an office or home.

Further advantages of an information network are to be found in improved control over the use of copyright material and the guarantee of rapid access to vital information e.g. in medical emergencies.

The Interuniversity Communications Council, which by September 1968 had been joined by 93 universities and colleges in the USA and Canada (cf. 27) having about two-thirds of the student population in both countries, is exploring the possibilities of an EDUNET by studies (cf. 4), by setting up interuniversity media networks (cf. 12), and by a permanent Panel on Computer Networks.

As a European interuniversity communications council as well as the planning of a European EDUNET has been called for on several occasions, it may well be that an EDUNET within Europe will already have reached a stage of development when EUDISED enters its third phase. Should this be the case the target for EUDISED in this final phase would involve the integration of its ability to evaluate, compress, and organise educational literature and information on educational material into a European EDUNET.

If a European EDUNET should not have reached the development stage by then, EUDISED would have to concentrate on its own organisational and physical network facilities and continue to co-ordinate them with those of other subject field systems until a European EDUNET came into existence.

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